

**S****HIGH CAVEKARST****OCD-ARTESIA****AUG - 6 2008**UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT**OCD-ARTESIA****APPLICATION FOR PERMIT TO DRILL OR REENTER**FORM APPROVED  
OMB No 1004-0137  
Expires March 31, 20075 Lease Serial No.  
**NMLC 100844**6 If Indian, Allottee or Tribe Name  
**N/A**

7 If Unit or CA Agreement, Name and No

8 Lease Name and Well No. **36817**  
**Reindeer "21" Federal #3**

9 API Well No.

**30-015-36538**10 Field and Pool, or Exploratory  
**Wolfcamp- Crow Flats**

11 Sec, T R M or Blk and Survey or Area

**Section 21, T16S, R28E**

12 County or Parish

**Eddy Co**

13. State

**NM**

2. Name of Operator

**COG Operating, LLC - 229137**3a Address **550 W. Texas Avenue, Suite 1300**  
**Midland, Texas 79701**3b Phone No. (include area code)  
**432-683-9158**

4. Location of Well (Report location clearly and in accordance with any State requirements \*)

At surface **1980' FNL & 430' FWL**At proposed prod zone **1980' FNL & 330' FEL**

14 Distance in miles and direction from nearest town or post office\*

**Approximately 12 miles Northwest of Loco Hills**15 Distance from proposed\*  
location to nearest  
property or lease line, ft  
(Also to nearest drig unit line, if any)**330' FSL**

16 No of acres in lease

**920**

17 Spacing Unit dedicated to this well

**160**18 Distance from proposed location\*  
to nearest well, drilling, completed,  
applied for, on this lease, ft.19 Proposed Depth  
**11070' MD, 6550' TVD**  
**10809' 6550' ← R14 horizontal plan 4/7/08 LUT**

20 BLM/BIA Bond No on file

**NMB 000215**21 Elevations (Show whether DF, KDB, RT, GL, etc )  
**3587' GL**22 Approximate date work will start\*  
**06/01/2008**23 Estimated duration  
**45 Days****24. Attachments**

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No 1, must be attached to this form

1. Well plat certified by a registered surveyor

2. A Drilling Plan

3. A Surface Use Plan (if the location is on National Forest System Lands, the  
SUPO must be filed with the appropriate Forest Service Office)4. Bond to cover the operations unless covered by an existing bond on file (see  
Item 20 above).

5. Operator certification

6. Such other site specific information and/or plans as may be required by the  
BLM.

25 Signature

Name (Printed/Typed)

**Lee Ann Rollins**

Date

**04/30/2008**

Title

**Agent for COG Operating, LLC**

Approved by (Signature)

**/s/ James Stovall**

Name (Printed/Typed)

**/s/ James Stovall**

Date

**AUG 04 2008**

Title

**FIELD MANAGER**

Office

**CARLSBAD FIELD OFFICE**

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to

**NOTE: NEW PIT RULE****19-15-17 NMAC PART 17****A form C-144 must be approved  
before starting drilling operations.****APPROVAL FOR TWO YEARS**It is a crime for any person knowingly and willfully to make to any department or agency of the United  
States as to any matter within its jurisdiction**ROSWELL CONTROLLED WATER BASIN****SEE ATTACHED FOR  
CONDITIONS OF APPROVAL****APPROVAL SUBJECT TO  
GENERAL REQUIREMENTS  
AND SPECIAL STIPULATIONS  
ATTACHED**

## STATEMENT ACCEPTING RESPONSIBILITY FOR OPERATIONS

C.O.G. Operating, LLC (229137)  
550 W. Texas Avenue, Ste. 1300  
Midland, TX 79701

The undersigned accepts all applicable terms, conditions, stipulations and restrictions covering operations conducted on the leased land or portion thereof, as described below:

Lease No – Surface Location: NMNM #100844  
Lease No – Bottom Hole Location: NMNM #100844

Well Name: Reindeer "21" Federal 3


Legal Description of Land: SL: 1980' FNL & 430' FWL Unit E  
BHL: 1980' FNL & 330' FEL Unit H  
Sec 21, T16S, R28E  
Eddy County, New Mexico

Formation(s) (if applicable): Wolfcamp- Crow Flats

Bond Coverage: \$25,000 statewide bond of C.O.G. Operating, LLC

BLM Bond File No: NMB 000215

5-2-08  
Date

  
John Coffman  
C.O.G. Operating, LLC

DISTRICT I  
1626 N. French Dr., Hobbs, NM 88240

DISTRICT II  
1301 W. Grand Avenue, Artesia, NM 88210

DISTRICT III  
1000 Rio Brazos Rd., Aztec, NM 87410

DISTRICT IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy, Minerals and Natural Resources Department

Form C-102  
Revised October 12, 2005

Submit to Appropriate District Office  
State Lease - 4 Copies  
Fee Lease - 3 Copies

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, New Mexico 87505

S

AUG 15 2008  
OCD-ARTESIA  
AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-	Pool Code 97102	Pool Name CROW FLATS: WOLFCAMP
Property Code 36817	Property Name REINDEER "21" FEDERAL	Well Number 3
OGRID No. 229137	Operator Name C.O.G. OPERATING L.L.C.	Elevation 3587'

Surface Location

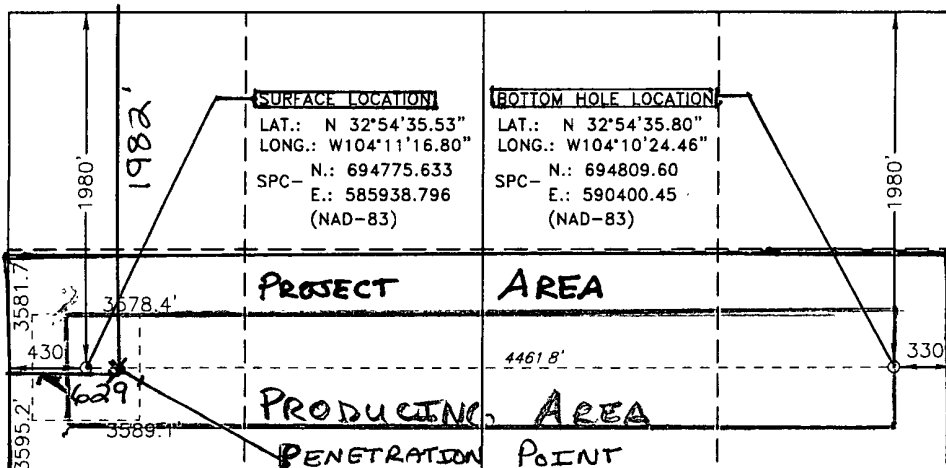
UL or lot No. E	Section 21	Township 16 S	Range 28 E	Lot Idn	Feet from the 1980	North/South line NORTH	Feet from the 430	East/West line WEST	County EDDY
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Bottom Hole Location If Different From Surface

UL or lot No. H	Section 21	Township 16 S	Range 28 E	Lot Idn	Feet from the 1980	North/South line NORTH	Feet from the 330	East/West line EAST	County EDDY
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Dedicated Acres 160	Joint or Infill	Consolidation Code	Order No.
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED  
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

	<p><b>OPERATOR CERTIFICATION</b></p> <p>I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p><i>Phyllis A. Edwards</i> Signature Date 8-04-08</p> <p>Phyllis A. Edwards Printed Name Regulatory Analyst</p> <p><b>SURVEYOR CERTIFICATION</b></p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief</p> <p>NOVEMBER 25, 2007</p> <p>Date Surveyed Signature of Surveyor Professional Surveyor</p> <p><i>GARY L. JONES</i> Signature of Surveyor Professional Surveyor</p> <p>W. 21 S. 16 S. 28 E. 44 Certificate No. Gary L. Jones 7977</p> <p>BASIN SURVEYS</p>
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**ATTACHMENT TO FORM 3160-3**  
**COG Operating LLC**  
**Reindeer "21" Federal # 3**  
**SL: 1980' FNL & 430' FWL Unit E**  
**BHL: 1980' FNL & 330' FEL Unit H**  
**Sec 21, T16S, R28E**  
**Eddy County, NM**

1. Proration Unit Spacing: 160 Acres
2. Ground Elevation: 3587'
3. Proposed Depths: Pilot hole TD = 6780', Horizontal TVD = 6520', Horizontal MD = 11070'
4. Estimated tops of geological markers:

Quaternary	Surface
Yates/Seven Rivers	600'
Queens	1125'
San Andres	1950'
Glorietta	3350'
Abo	5375'
Wolfcamp	6530'

5. Possible mineral bearing formations:

Water Sand	Fresh Water	150'
San Andres	Oil / Gas	1950'
Glorietta	Oil / Gas	3350'
Abo	Oil / Gas	5375'
Wolfcamp	Oil / Gas	6530'

6. Casing Program

<u>Hole size</u>	<u>Interval</u>	<u>OD of Casing</u>	<u>Weight</u>	<u>Cond.</u>	<u>Collar</u>	<u>Grade</u>
17-1/2"	0' - +/-500'	13-3/8"	48#	New	STC	H40
Collapse sf - 2.98, Burst sf - 2.33, Tension sf - 13.42						
12 1/4"	0' - 2200'	9-5/8"	40#	New	STC	J-55
Collapse sf - 2.46, Burst sf - 1.35, Tension sf - 6.48						
8-3/4"	0' - 6000' MD	5-1/2"	17#	New	LTC	L-80
Collapse sf - 2.08, Burst sf - 2.35, Tension sf - 2.92						
7-7/8"	6000' - 11070' MD	5-1/2"	17#	New	BTC	L-80
Collapse sf - 1.85, Burst sf - 2.28, Tension sf - 29.19						

*10809' drilled to depth 4/7/08 WJT*

**ATTACHMENT TO FORM 3160-3**  
**COG Operating LLC**  
**Reindeer "21" Federal # 3**  
**Page 2 of 3**

**7. Cement Program**

13 3/8" Surface Casing set at +/- 500', Circ to Surf with +/- 500 sx Class "C" w/ 2% CaCl<sub>2</sub>, 1.35 yd.

9 5/8" Intermediate Casing set at +/- 2200', Circ. to Surf with +/- 700 sx 50/50 Poz "C", 2.45 yd. & 200 sx Class "C" w/ 2% CaCl<sub>2</sub>, 1.35 yd.

5 1/2" Production Casing set at +/- <sup>10300'</sup>~~11070'~~ MD, 6520' TVD, Cement with +/- 200 sx. 50/50/2 "C", 1.37 yd & +/- 650 sx Class "H", 1.18 yd. Est. TOC @ 6000' *See COA*

**8. Pressure Control Equipment:**

After setting 13 3/8" casing and installing 3000 psi casing head, NU 13 5/8" 3000 psi annular BOP. Test annular BOP, casing and manifold with clear fluid to 1000 psi w/ rig pump.

After setting 9 5/8" casing and installing 3000 psi casing spool, NU 3000 psi double ram BOP and 3000 psi annular BOP. Test double ram BOP and manifold to 3000# with clear fluid and annular to 1500 psi using an independent tester, this equipment will be used continuously until TD is reached. Blind rams will be operationally checked on each trip out of hole. Pipe rams will be operationally checked each 24 hour period. These checks will be noted on daily tour sheets. Other accessories to the BOP equipment include a Kelly cock and floor safety valves, choke lines and choke manifold with 3000 psi WP rating.

**9. Proposed Mud Circulating System**

Interval	Mud Wt.	Visc.	FL	Type Mud System
0' - 500'	8.5	28	NC	Fresh water native mud w/ paper for seepage and sweeps. Lime for PH.
<i>per casing cement program 6/2/08 WHT</i> 500' - <sup>2200</sup> <del>1800</del> '	9.1	30	NC	Cut brine mud, lime for PH and paper for seepage and sweeps. <i>See COA</i>
<sup>2200</sup> <del>1800</del> ' - 5300'	9.1	29	NC	Drill section with fresh water/cut brine circulating the reserve utilizing periodic sweeps of paper as needed for seepage control and solids removal.
5300' - 11070'	9.5	36	10	Drill horizontal section with XCD polymer / cut brine / starch.

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept at the well site at all times.

**10. Production Hole Drilling Summary:**

Drill 8-3/4" hole thru Wolfcamp, run open hole logs. Spot 150 sx. "H" Kick off plug from +/- 6400' to +/- 6000'. Time drill and kick off 7-7/8" hole at +/- 6000', building curve over +/- 475' to horizontal at 6550' TVD. Drill horizontal section in an easterly direction for +/-4500' lateral. Run production casing and cement.

**ATTACHMENT TO FORM 3160-3  
COG Operating LLC  
Reindeer "21" Federal # 3  
Page 3 of 3**

**11. Auxiliary Well Control and Monitoring Equipment**

- A. Kelly cock will be kept in the drill string at all times.
- B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

**12. Logging, Testing and Coring Program:**

- A. The electric logging program will consist of GR-Dual Laterolog, Spectral Density, Dual Spaced Neutron, CSNG Log and will be ran from T.D. in Pilot hole to 9 5/8" casing shoe.
- B. The mud logging program will consist of lagged 10' samples from intermediate casing point to T.D. in vertical pilot hole and from Kick off point to TD in Horizontal hole.
- C. Drill Stem test is not anticipated.
- D. No conventional coring is anticipated.
- E. Further testing procedures will be determined after the 5 1/2" production casing has been cemented at TD based on drill shows and log evaluation.

**13. Abnormal Conditions, Pressures, Temperatures and Potential Hazards:**

No abnormal pressures or temperatures are anticipated. The estimated bottom hole at TD is 110 degrees and estimated maximum bottom hole pressure is 2838 psig. Low levels of Hydrogen sulfide have been monitored in producing wells in the area, so H2S may be present while drilling of the well. An H2S plan is attached to the Drilling Program. No major loss of circulation zones has been reported in offsetting wells.

**14. Anticipated Starting Date**

Drilling operations will commence approximately on June 1, 2008 with drilling and completion operations lasting approximately 45 days.

# **COG Operating LLC**

**Reindeer 21 Federal #3**

**S21 T16S R28E**

**Reindeer 21 Federal #3**

**Original Hole**

**Plan: Plan #1**

## **Pathfinder Survey Report**

**22 February, 2008**

# C.O.G. Operating L.L.C.



Azimuths to Grid North  
 True North: -0.08°  
 Magnetic North: 8.23°  
 Magnetic Field  
 Strength: 49313.6snT  
 Dip Angle: 60.81°  
 Date: 2/22/2008  
 Model: IGRF200510

Project: Reindeer 21 Federal #3  
 Site: S21 T16S R28E  
 Well: Reindeer 21 Federal #3  
 Wellbore: Original Hole  
 Plan: Plan #1 (Reindeer 21 Federal #3/Original Hole)



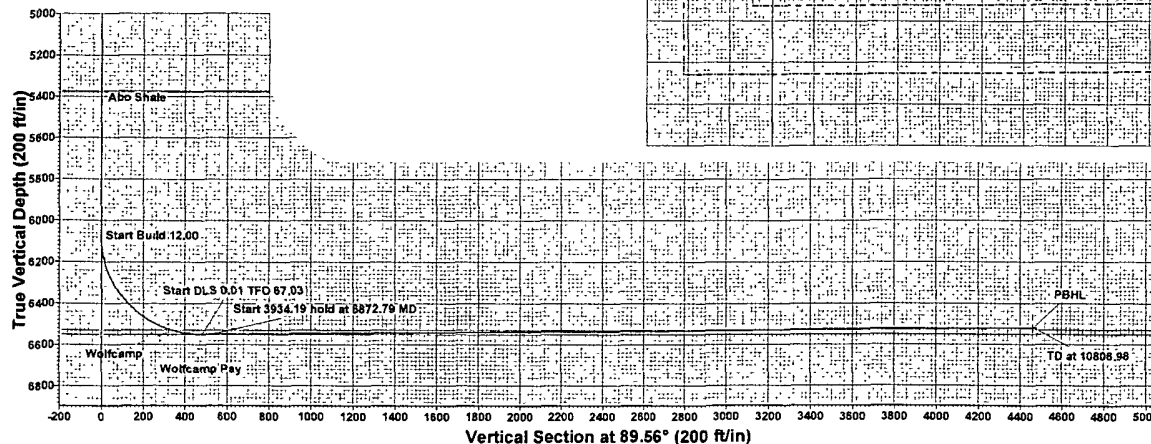
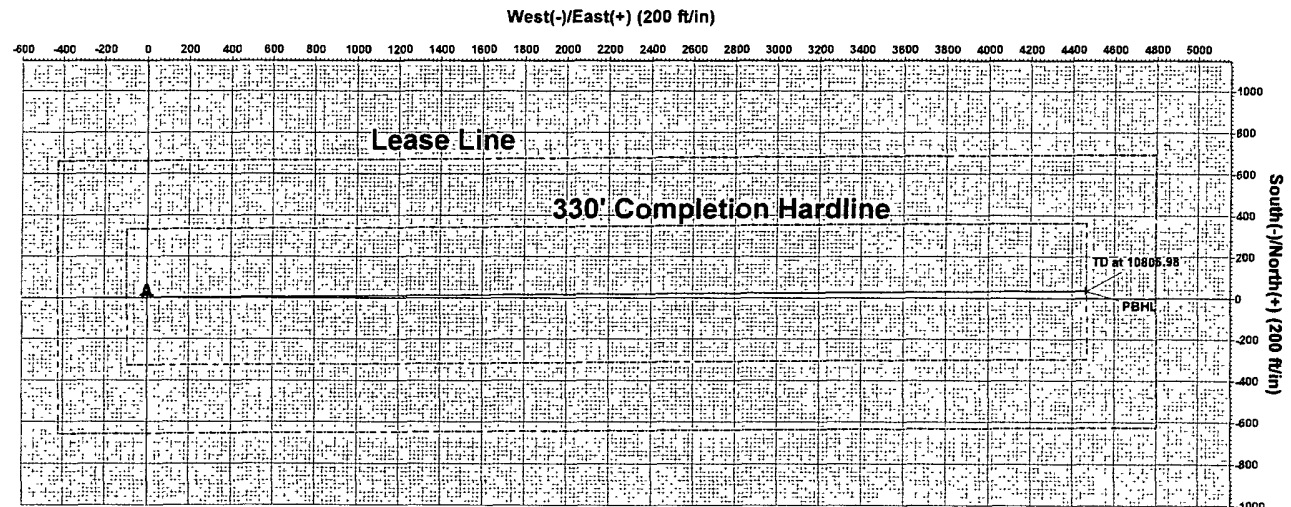
WELL DETAILS Reindeer 21 Federal #3						
Ground Elevation 3587.00						
RKB Elevation EST RKB @ 3587.00ft						
Rig Name						
+N-S	+E-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	594775.633	585938.798	32° 54' 35.530 N	104° 11' 16.797 W	

PROJECT DETAILS: Reindeer 21 Federal #3  
 Geodetic System: US State Plane 1983  
 Datum: North American Datum 1983  
 Ellipsoid: GRS 1980  
 Zone: New Mexico Eastern Zone  
 System Datum: Mean Sea Level  
 Local North: Grid

SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	6072.55	0.00	0.00	6072.55	0.00	0.00	0.00	0.00	0.00	
3	6826.13	90.43	89.56	6550.00	3.89	481.03	12.00	89.56	481.05	
4	6872.79	90.43	89.56	6549.85	4.05	527.89	0.01	67.03	527.70	
5	10806.98	90.43	89.56	6520.00	33.97	4461.65	0.00	0.00	4461.78	PBHL

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)					
Name	TVD	+N-S	+E-W	Northing	Easting
PBHL	6520.00	33.97	4461.65	594809.800	590400.450
				Shape	Point

FORMATION TOP DETAILS			
TVD	Path	MD	Formation
600.00	600.00		Yates
1125.00	1125.00		Queen
1950.00	1950.00		San Andres D
3350.00	3350.00		Glorieta
5375.00	5375.00		Abo Shale
6520.00	6883.81		Wolfcamp
6550.00	6818.79		Wolfcamp Pay



Plan Plan #1 (Reindeer 21 Federal #3/Original Hole)	
Created By: Mark Freeman	Date: 10/58, February 22 2008
Checked: _____	Date: _____



**WHS**  
Pathfinder Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Reindeer 21 Federal #3
<b>Project:</b>	Reindeer 21 Federal #3	<b>TVD Reference:</b>	EST RKB @ 3587.00ft
<b>Site:</b>	S21 T16S R28E	<b>MD Reference:</b>	EST RKB @ 3587.00ft
<b>Well:</b>	Reindeer 21 Federal #3	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #1	<b>Database:</b>	EDM 2003.16 Single User Db

<b>Project</b>	Reindeer 21 Federal #3, Eddy County, NM		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	New Mexico Eastern Zone		

<b>Site</b>	S21 T16S R28E		
<b>Site Position:</b>		<b>Northing:</b>	694,775.633 ft
<b>From:</b>	Map	<b>Easting:</b>	585,938.796 ft
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	"
		<b>Latitude:</b>	32° 54' 35.530 N
		<b>Longitude:</b>	104° 11' 16.797 W
		<b>Grid Convergence:</b>	0.08 °

<b>Well:</b>	Reindeer 21 Federal #3		
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b> 694,775.633 ft
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b> 585,938.796 ft
<b>Position Uncertainty</b>	0.00 ft	<b>Wellhead Elevation:</b>	ft
		<b>Latitude:</b>	32° 54' 35.530 N
		<b>Longitude:</b>	104° 11' 16.797 W
		<b>Ground Level:</b>	3,587.00 ft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination</b>	<b>Dip Angle</b>	<b>Field Strength</b>
			(°)	(°)	(nT)
	IGRF200510	2/22/2008	8.31	60.81	49,314

<b>Design</b>	Plan #1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S</b>	<b>+E/-W</b>	<b>Direction</b>
	(ft)	(ft)	(ft)	(°)
	0.00	0.00	0.00	89.56

<b>Survey Tool Program</b>	Date 2/22/2008			
<b>From</b>	<b>To</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
(ft)	(ft)			
0.00	10,806.97	Plan #1 (Original Hole)	MWD	MWD - Standard

<b>Planned Survey</b>								
<b>MD</b>	<b>Inc</b>	<b>Azi</b>	<b>TVD</b>	<b>N/S</b>	<b>E/W</b>	<b>V. Sec</b>	<b>DLeg</b>	
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(" / 100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	

**WHS**  
Pathfinder Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Reindeer 21 Federal #3
<b>Project:</b>	Reindeer 21 Federal #3	<b>TVD Reference:</b>	EST RKB @ 3587.00ft
<b>Site:</b>	S21 T16S R28E	<b>MD Reference:</b>	EST RKB @ 3587.00ft
<b>Well:</b>	Reindeer 21 Federal #3	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #1	<b>Database:</b>	EDM 2003.16 Single User Db

Planned Survey							
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00

# WHS

## Pathfinder Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Reindeer 21 Federal #3
<b>Project:</b>	Reindeer 21 Federal #3	<b>TVD Reference:</b>	EST RKB @ 3587.00ft
<b>Site:</b>	S21 T16S R28E	<b>MD Reference:</b>	EST RKB @ 3587.00ft
<b>Well:</b>	Reindeer 21 Federal #3	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #1	<b>Database:</b>	EDM 2003.16 Single User Db

Planned Survey								
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	
6,072.55	0.00	0.00	6,072.55	0.00	0.00	0.00	0.00	
6,075.00	0.29	89.56	6,075.00	0.00	0.01	0.01	12.00	
6,100.00	3.29	89.56	6,099.98	0.01	0.79	0.79	12.00	
6,125.00	6.29	89.56	6,124.89	0.02	2.88	2.88	12.00	
6,150.00	9.29	89.56	6,149.66	0.05	6.27	6.27	12.00	
6,175.00	12.29	89.56	6,174.22	0.08	10.95	10.95	12.00	
6,200.00	15.29	89.56	6,198.49	0.13	16.91	16.91	12.00	
6,225.00	18.29	89.56	6,222.42	0.19	24.13	24.13	12.00	
6,250.00	21.29	89.56	6,245.94	0.25	32.60	32.60	12.00	
6,275.00	24.29	89.56	6,268.99	0.32	42.28	42.28	12.00	
6,300.00	27.29	89.56	6,291.49	0.41	53.16	53.16	12.00	
6,325.00	30.29	89.56	6,313.40	0.50	65.20	65.20	12.00	
6,350.00	33.29	89.56	6,334.65	0.60	78.37	78.37	12.00	
6,375.00	36.29	89.56	6,355.18	0.71	92.63	92.63	12.00	
6,400.00	39.29	89.56	6,374.93	0.83	107.95	107.95	12.00	
6,425.00	42.29	89.56	6,393.85	0.95	124.28	124.28	12.00	
6,450.00	45.29	89.56	6,411.90	1.09	141.58	141.58	12.00	
6,475.00	48.29	89.56	6,429.01	1.23	159.80	159.80	12.00	
6,500.00	51.29	89.56	6,445.15	1.37	178.89	178.89	12.00	
6,525.00	54.29	89.56	6,460.26	1.53	198.80	198.80	12.00	
6,550.00	57.29	89.56	6,474.31	1.69	219.47	219.48	12.00	
6,575.00	60.29	89.56	6,487.27	1.85	240.85	240.86	12.00	
6,600.00	63.29	89.56	6,499.08	2.02	262.88	262.89	12.00	
6,625.00	66.29	89.56	6,509.73	2.19	285.49	285.50	12.00	
6,650.00	69.29	89.56	6,519.17	2.37	308.64	308.65	12.00	
6,675.00	72.29	89.56	6,527.40	2.55	332.24	332.25	12.00	
6,700.00	75.29	89.56	6,534.37	2.74	356.25	356.26	12.00	
6,725.00	78.29	89.56	6,540.08	2.92	380.58	380.59	12.00	
6,750.00	81.29	89.56	6,544.51	3.11	405.18	405.19	12.00	
6,775.00	84.29	89.56	6,547.65	3.30	429.98	429.99	12.00	
6,800.00	87.29	89.56	6,549.48	3.49	454.91	454.92	12.00	
6,826.13	90.43	89.56	6,550.00	3.69	481.03	481.05	12.00	
6,872.79	90.43	89.56	6,549.65	4.05	527.69	527.70	0.01	
6,900.00	90.43	89.56	6,549.45	4.26	554.90	554.91	0.00	
7,000.00	90.43	89.56	6,548.69	5.02	654.89	654.91	0.00	
7,100.00	90.43	89.56	6,547.94	5.78	754.88	754.91	0.00	
7,200.00	90.43	89.56	6,547.18	6.54	854.88	854.90	0.00	
7,300.00	90.43	89.56	6,546.43	7.30	954.87	954.90	0.00	
7,400.00	90.43	89.56	6,545.68	8.06	1,054.87	1,054.90	0.00	

# WHS

## Pathfinder Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Reindeer 21 Federal #3
<b>Project:</b>	Reindeer 21 Federal #3	<b>TVD Reference:</b>	EST RKB @ 3587.00ft
<b>Site:</b>	S21 T16S R28E	<b>MD Reference:</b>	EST RKB @ 3587.00ft
<b>Well:</b>	Reindeer 21 Federal #3	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #1	<b>Database:</b>	EDM 2003.16 Single User Db

Planned Survey								
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	
7,500.00	90.43	89.56	6,544.92	8.82	1,154.86	1,154.90	0.00	
7,600.00	90.43	89.56	6,544.17	9.58	1,254.86	1,254.89	0.00	
7,700.00	90.43	89.56	6,543.42	10.34	1,354.85	1,354.89	0.00	
7,800.00	90.43	89.56	6,542.66	11.10	1,454.84	1,454.89	0.00	
7,900.00	90.43	89.56	6,541.91	11.86	1,554.84	1,554.88	0.00	
8,000.00	90.43	89.56	6,541.16	12.62	1,654.83	1,654.88	0.00	
8,100.00	90.43	89.56	6,540.40	13.38	1,754.83	1,754.88	0.00	
8,200.00	90.43	89.56	6,539.65	14.14	1,854.82	1,854.88	0.00	
8,300.00	90.43	89.56	6,538.89	14.90	1,954.82	1,954.87	0.00	
8,400.00	90.43	89.56	6,538.14	15.66	2,054.81	2,054.87	0.00	
8,500.00	90.43	89.56	6,537.39	16.42	2,154.80	2,154.87	0.00	
8,600.00	90.43	89.56	6,536.63	17.18	2,254.80	2,254.86	0.00	
8,700.00	90.43	89.56	6,535.88	17.95	2,354.79	2,354.86	0.00	
8,800.00	90.43	89.56	6,535.13	18.71	2,454.79	2,454.86	0.00	
8,900.00	90.43	89.56	6,534.37	19.47	2,554.78	2,554.86	0.00	
9,000.00	90.43	89.56	6,533.62	20.23	2,654.78	2,654.85	0.00	
9,100.00	90.43	89.56	6,532.86	20.99	2,754.77	2,754.85	0.00	
9,200.00	90.43	89.56	6,532.11	21.75	2,854.76	2,854.85	0.00	
9,300.00	90.43	89.56	6,531.36	22.51	2,954.76	2,954.84	0.00	
9,400.00	90.43	89.56	6,530.60	23.27	3,054.75	3,054.84	0.00	
9,500.00	90.43	89.56	6,529.85	24.03	3,154.75	3,154.84	0.00	
9,600.00	90.43	89.56	6,529.10	24.79	3,254.74	3,254.84	0.00	
9,700.00	90.43	89.56	6,528.34	25.55	3,354.74	3,354.83	0.00	
9,800.00	90.43	89.56	6,527.59	26.31	3,454.73	3,454.83	0.00	
9,900.00	90.43	89.56	6,526.84	27.07	3,554.72	3,554.83	0.00	
10,000.00	90.43	89.56	6,526.08	27.83	3,654.72	3,654.82	0.00	
10,100.00	90.43	89.56	6,525.33	28.59	3,754.71	3,754.82	0.00	
10,200.00	90.43	89.56	6,524.57	29.35	3,854.71	3,854.82	0.00	
10,300.00	90.43	89.56	6,523.82	30.11	3,954.70	3,954.82	0.00	
10,400.00	90.43	89.56	6,523.07	30.87	4,054.70	4,054.81	0.00	
10,500.00	90.43	89.56	6,522.31	31.63	4,154.69	4,154.81	0.00	
10,600.00	90.43	89.56	6,521.56	32.39	4,254.68	4,254.81	0.00	
10,700.00	90.43	89.56	6,520.81	33.15	4,354.68	4,354.80	0.00	
10,806.98	90.43	89.56	6,520.00	33.97	4,461.65	4,461.78	0.00	

# WHS

## Pathfinder Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Reindeer 21 Federal #3
<b>Project:</b>	Reindeer 21 Federal #3	<b>TVD Reference:</b>	EST RKB @ 3587.00ft
<b>Site:</b>	S21 T16S R28E	<b>MD Reference:</b>	EST RKB @ 3587.00ft
<b>Well:</b>	Reindeer 21 Federal #3	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #1	<b>Database:</b>	EDM 2003.16 Single User Db

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
PBHL	0.00	0.00	6,520.00	33.97	4,461.65	694,809.600	590,400.450	32° 54' 35.803 N	104° 10' 24.459 W
- plan hits target									
- Point									

Formations						
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction	
(ft)	(ft)			(°)	(°)	
1,125.00	1,125.00	Queen		0.00		
600.00	600.00	Yates		0.00		
5,375.00	5,375.00	Abo Shale		0.00		
1,950.00	1,950.00	San Andres D		0.00		
6,683.81	6,530.00	Wolfcamp		0.00		
3,350.00	3,350.00	Glorieta		0.00		
6,818.79	6,550.00	Wolfcamp Pay		0.00		

Checked By: _____	Approved By: _____	Date: _____
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EXHIBIT "F"

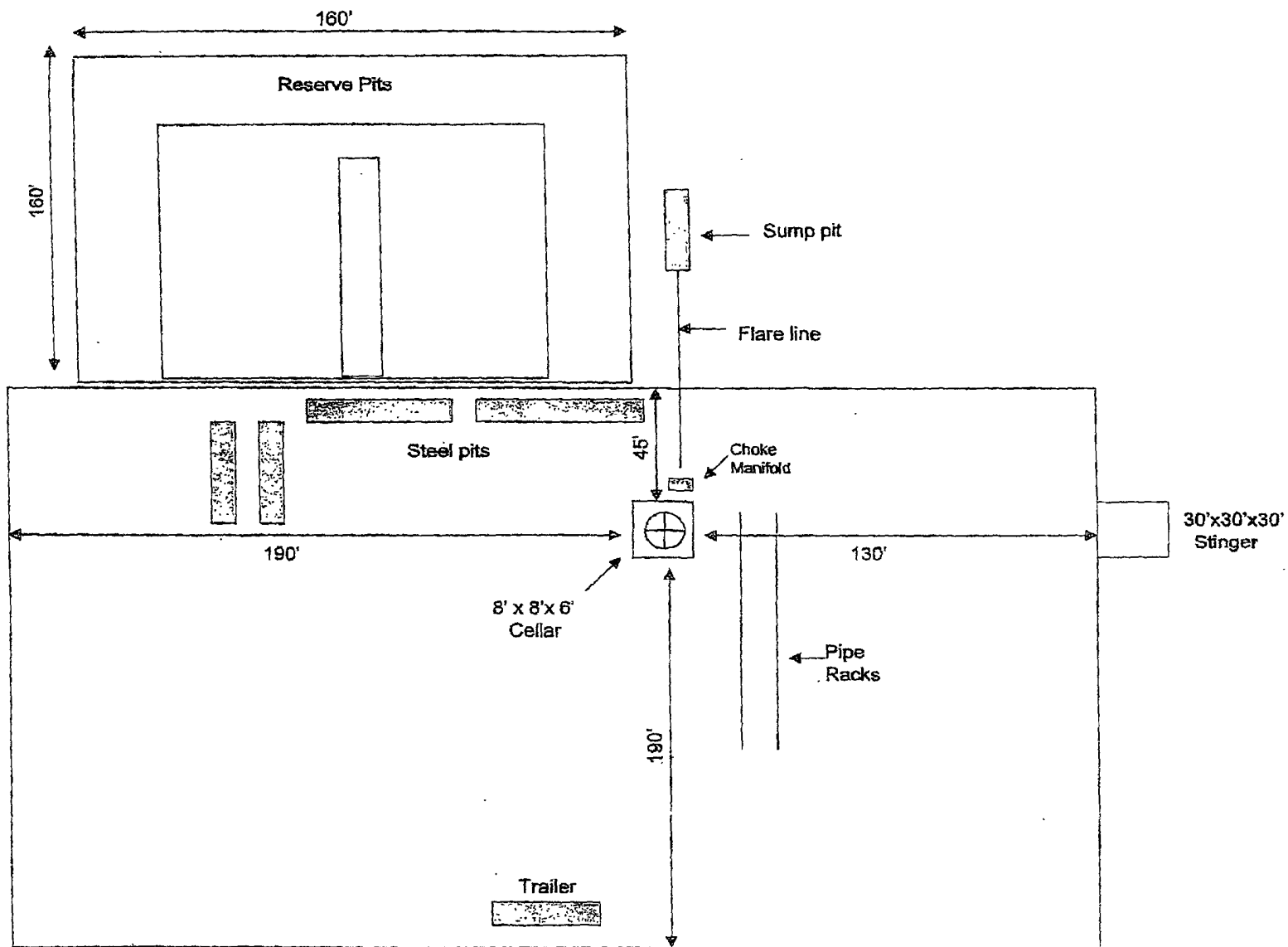


EXHIBIT "G"

BOPE SCHEMATIC

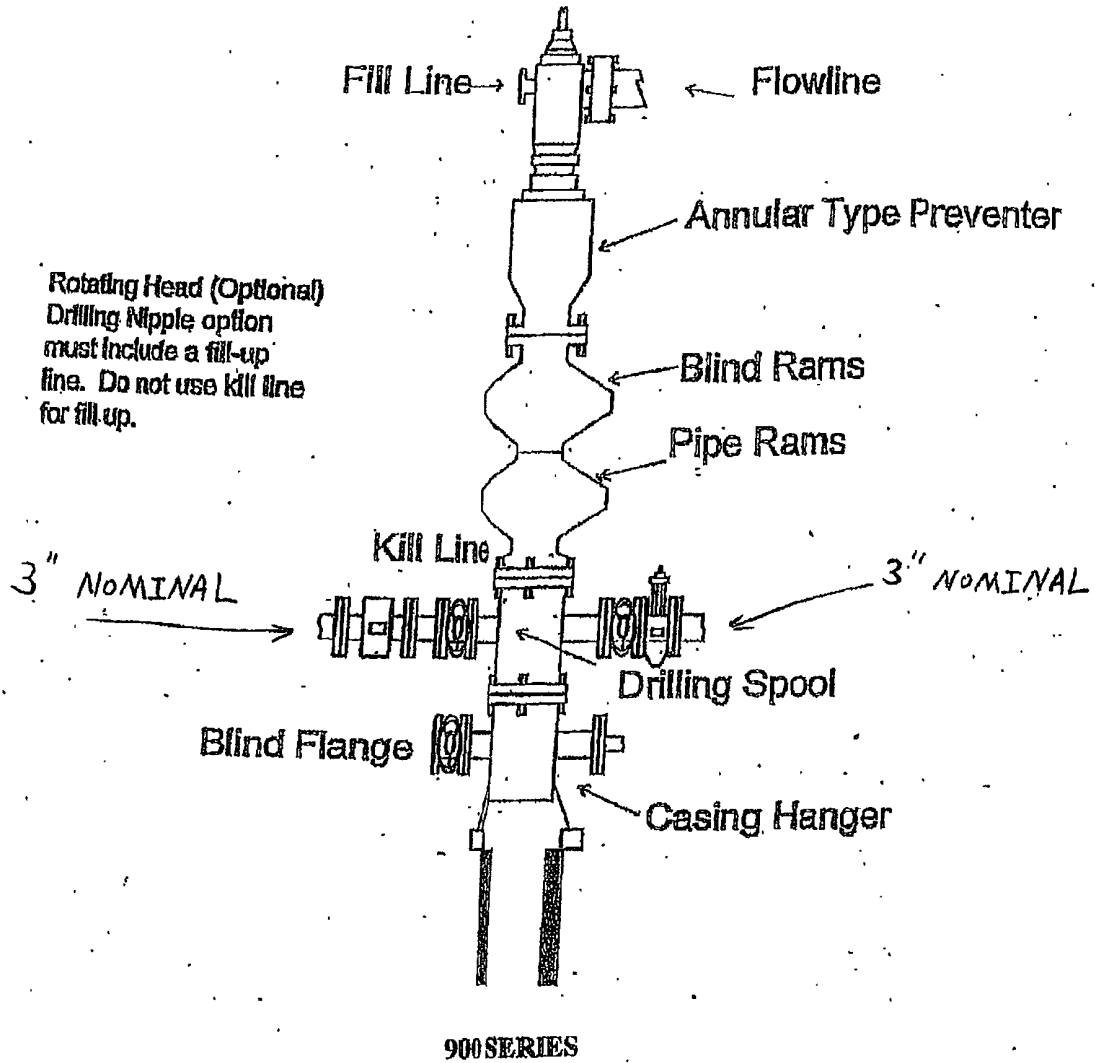
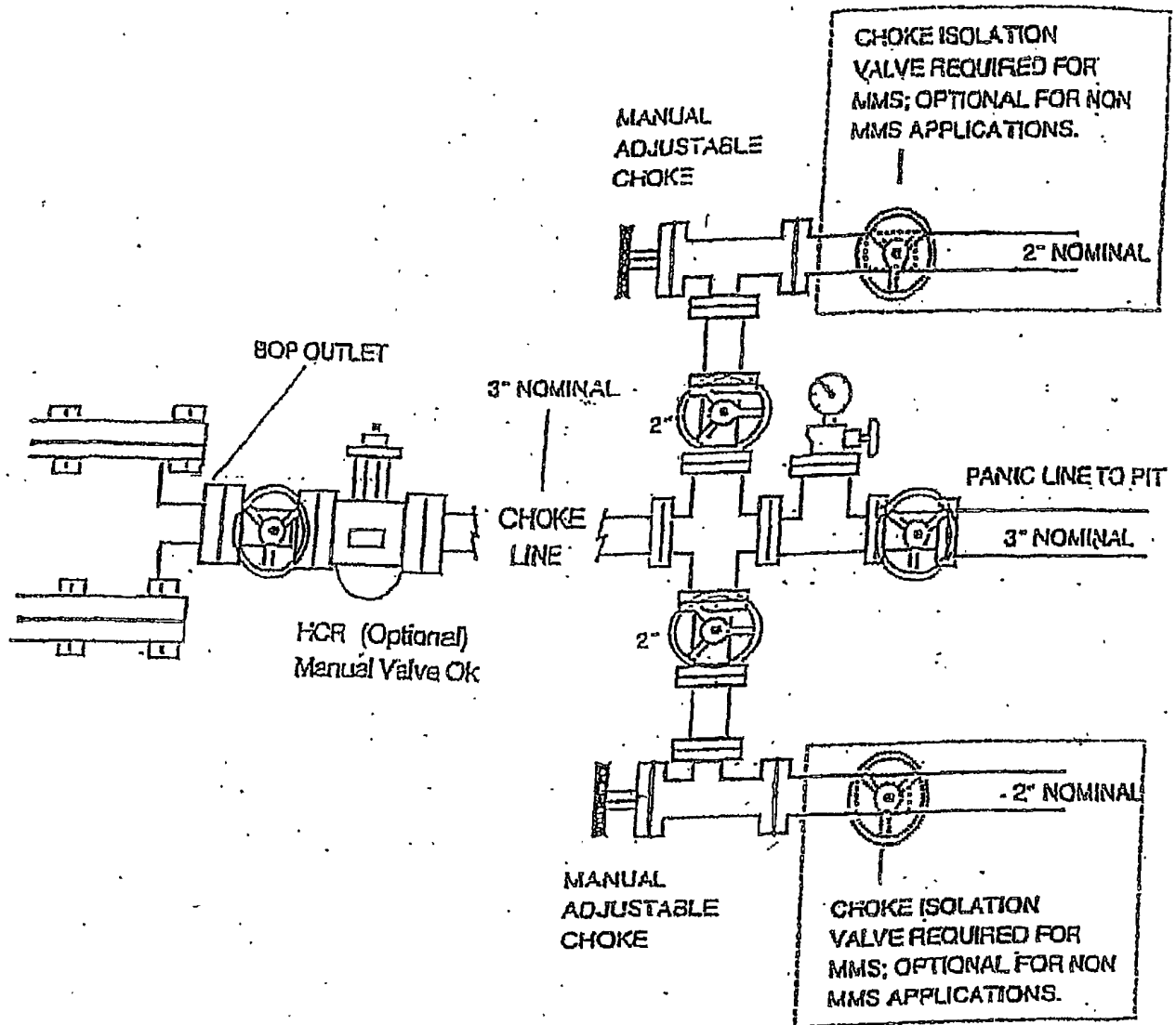


EXHIBIT "H"

CHOKE MANIFOLD

3M SERVICE





# **COG OPERATING, LLC**

## **HYDROGEN SULFIDE (H<sub>2</sub>S) CONTINGENCY PLAN FOR DRILLING / COMPLETING / WORKOVER / FACILITY WITH THE EXPECTATION OF H<sub>2</sub>S IN EXCESS OF 100 PPM**

**Reindeer "21" Federal #3  
NEW DRILL WELL  
SL: 1980' FNL & 430' FWL    Unit E  
BHL: 1980' FNL & 330' FEL    Unit H  
Sec 21, T16S, R28E  
Eddy County, New Mexico**

**This well / facility is not expected to have H<sub>2</sub>S, but the following is submitted as requested.**

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III.	Emergency Numbers for Notification	Page 4
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V.	Public Evacuation Plan	Page 6
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VII.	Required Emergency Equipment	Page 8
VIII.	Using Self-Contained Breathing Air Equipment (SCBA)	Page 9
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## **GENERAL H2S EMERGENCY ACTIONS**

In the event of any evidence of H2S emergency, the following plan will be initiated:

1. All personnel will immediately evacuate to an up-wind and if possible up-hill "safe area".
2. If for any reason a person must enter the hazardous area, they must wear a SCBA (self-contained breathing apparatus).
3. Always use the "buddy system".
4. Isolate the well / problem if possible.
5. Account for all personnel.
6. Display the proper colors warning all unsuspecting personnel of the danger at hand.
7. Contact the company representative as soon as possible if not at the location (use the enclosed call list as instructed).

At this point the company representative will evaluate the situation and coordinate the necessary duties to bring the situation under control, and if necessary, the notification of emergency response agencies and residents.

## **EMERGENCY PROCEDURES FOR AN UNCONTROLLABLE RELEASE OF H2S**

1. All personnel will don the self-contained breathing apparatus.
2. Remove all personnel to the "safe area: (always use the "buddy system").
3. Contact company representative if not on location.
4. Set in motion the steps to protect and / or remove the general public to any upwind "safe are". Maintain strict security and safety procedures while dealing with the source.
5. No entry to any unauthorized personnel.
6. Notify the appropriate agencies:  
City Police - City streets  
State Police - State Roads  
County Sheriff - County Roads
7. Call the NMOCD.

If at this time the supervising person determines the release of H2S cannot be contained to the site location and the general public is in harms way, he will immediately notify public safety personnel.

### **EMERGENCY CALL LIST**

	<u>Office</u>	<u>Cell</u>	<u>Home</u>
John Coffman	432-683-7443	432-631-9762	432-699-5552
Erick Nelson	432-683-7443	432-238-7591	
Matt Corser	432-683-7443	432-413-0071	

### **EMERGENCY RESPONSE NUMBERS**

**Eddy County, New Mexico**

<b>State Police</b>	<b>505-748-9718</b>
<b>Eddy County Sheriff</b>	<b>505-746-2701</b>
<b>Emergency Medical Services (Ambulance)</b>	<b>911 or 505-746-2701</b>
<b>Eddy County Emergency Management (Harry Burgess)</b>	<b>505-887-9511</b>
<b>State Emergency Response Center (SERC)</b>	<b>505-476-9620</b>
<b>Carlsbad Police Department</b>	<b>505-885-2111</b>
<b>Carlsbad Fire Department</b>	<b>505-885-3125</b>
<b>New Mexico Oil Conservation Division</b>	<b>505-748-1283</b>
<b>Callaway Safety Equipment, Inc.</b>	<b>505-392-2973</b>

### **PROTECTION OF THE GENERAL (ROE) RADIUS OF EXPOSURE**

In the event greater than 100 ppg H<sub>2</sub>S is present, the ROE calculations will be done to determine if the following is warranted:

- \* 100 ppm at any public area (any place not associated with this site)
- \* 500 ppm at any public road (any road which the general public may travel).
- \* 100 ppm radius of 3000' will be assumed if there is insufficient data to do the calculations, and there is a reasonable expectation that H<sub>2</sub>S could be present in concentrations greater than 100 ppm in the gas mixture.

**Calculation for the 100 ppm ROE:** (H<sub>2</sub>S concentrations in decimal form)

$$X = [(1.589)(\text{concentration})(Q)] (0.6258)$$

10,000 ppm + = .01  
1,000 ppm + = .001

**Calculation for the 500 ppm ROE:** 100 ppm + = .0001  
10 ppm + = .00001

$$X = [(0.4546)(\text{concentration})(Q)] (.06258)$$

EXAMPLE: If a well / facility has been determined to have 150 ppm H<sub>2</sub>S in the gas mixture and the well / facility is producing at a gas rate of 200 MCFD then:

ROE for 100 ppm  $X = [(1.589)(.00010)(200,000)] (0.6258)$   
 $X = 8.8'$

ROE for 500 ppm  $X = [(0.4546)(.00050)(200,000)] (0.6258)$   
 $X = 10.9'$

These calculations will be forwarded to the appropriate NMOCD district office when applicable.

## **PUBLIC EVACUATION PLAN**

When the supervisor has determined that the general public will be involved, the following plan will be implemented.

1. Notification of the emergency response agencies of the hazardous condition and implement evacuation procedures.
2. A trained person in H<sub>2</sub>S safety shall monitor with detection equipment the H<sub>2</sub>S concentration, wind and area of exposure. This person will determine the outer perimeter of the hazardous area. The extent of the evacuation area will be determined from the data being collected. Monitoring shall continue until the situation has been resolved. All monitoring equipment shall be UL approved for use in Class I Groups A, B, C & D, Division I hazardous locations. All monitors will have a minimum capability of measuring H<sub>2</sub>S, oxygen, and flammable values.
3. Law enforcement shall be notified to set up necessary barriers and maintain such for the duration of the situation as well as aid in the evacuation procedure.
4. The company representative shall stay in communication with all agencies throughout the duration of the situation and inform such agencies when the situation has been contained and the effected area is safe to enter.

## **PROCEDURE FOR IGNITING AN UNCONTROLLABLE CONDITION**

The decision to ignite a well should be a last resort and one, if not both, of the following pertain:

1. Human life and / or property are endangered.
2. There is no hope of bringing the situation under control with the prevailing conditions at the site.

### **Instructions for Igniting the Well:**

1. Two people are required. They must be equipped with positive pressure, self-contained breathing apparatus and "D"-ring style, full body, OSHA approved safety harness. Non-flammable rope will be attached.
2. One of the people will be a qualified safety person who will test the atmosphere for H<sub>2</sub>S, oxygen and LFL. The other person will be the company representative.
3. Ignite upwind from a distance no closer than necessary. Make sure that where you ignite from has the maximum escape avenue available. A 25mm flare gun with a range of approximately +/- 500 feet shall be used to ignite the gas.
4. Before igniting, check for the presence of combustible gases.
5. After igniting, continue emergency actions and procedures as before.

## **REQUIRED EMERGENCY EQUIPMENT**

### **1. Breathing Apparatus**

- \* Rescue Packs (SCBA) – 1 unit shall be placed at each breathing area, 2 shall be stored in the safety trailer.
- \* Work / Escape Packs – 4 packs shall be stored on the rig floor with sufficient air hose not to restrict work activity.
- \* Emergency Escape Packs – 4 packs shall be stored in the doghouse for emergency evacuation.

### **2. Signage and Flagging**

- \* One Color Code Condition Sign will be placed at the entrance to the site reflecting the possible conditions at the site.
- \* A Colored Condition flag will be on display reflecting the condition at the site at that time.

### **3. Briefing Area**

- \* Two perpendicular areas will be designated by signs and readily accessible.

### **4. Windsocks**

- \* Two windsocks will be placed in strategic locations, visible from all angles.

### **5. H2S Detectors and Alarms**

\* The stationary detector with three (3) sensors will be placed in the upper dog house if equipped, set to visually alarm @ 10 ppm and audible alarm @ 15 ppm. Calibrate a minimum of every 30 days or as needed. The three sensors will be placed in the following places: (Gas sample tubes will be stored in the safety trailer):

- \* Rig Floor
- \* Bell Nipple
- \* End of flow line or where well bore fluid is being discharged

### **6. Auxiliary Rescue Equipment**

- \* Stretcher
- \* Two OSHA full body harnesses
- \* 100' of 5/8" OSHA approved rope
- \* One 20 lb. Class ABC fire extinguisher
- \* Communication via cell phones on location and vehicles on location



## **USING SELF-CONTAINED BREATHING AIR EQUIPMENT (SCBA)**

1. SCBA should be worn when any of the following are performed:
  - \* Working near the top or on top of a tank
  - \* Disconnecting any line where H<sub>2</sub>S can reasonably be expected.
  - \* Sampling air in the area to determine if toxic concentrations of H<sub>2</sub>S exist.
  - \* Working in areas where over 10 ppm of H<sub>2</sub>S has been detected.
  - \* At any time there is a doubt of the level of H<sub>2</sub>S in the area.
2. All personnel shall be trained in the use of SCBA prior to working in a potentially hazardous location.
3. Facial hair and standard eyeglasses are not allowed with SCBA.
4. Contact lenses are never allowed with SCBA.
5. When breaking out any line where H<sub>2</sub>S can reasonably be expected.
6. After each use, the SCBA unit shall be cleaned, disinfected, serviced and inspected.
7. All SCBA shall be inspected monthly.

## **RESCUE & FIRST AID FOR VICTIMS OF H<sub>2</sub>S POISONING**

- \* Do not panic.
- \* Remain calm and think.
- \* Get on the breathing apparatus.
- \* Remove the victim to the safe breathing area as quickly as possible, upwind and uphill from source or crosswind to achieve upwind.
- \* Notify emergency response personnel.
- \* Provide artificial respiration and / or CPR as necessary.
- \* Remove all contaminated clothing to avoid further exposure.
- \* A minimum of two (2) personnel on location shall be trained in CPR and First Aid.

## Toxic Effects of H2S Poisoning

Hydrogen Sulfide is extremely toxic. The acceptable ceiling concentration for eight-hour exposure is 10 PPM, which is .001% by volume. Hydrogen Sulfide is heavier than air (specific gravity-1.192) and is colorless and transparent. Hydrogen Sulfide is almost as toxic as Hydrogen Cyanide and is 5-6 times more toxic than Carbon Monoxide. Occupational exposure limits for Hydrogen sulfide and other gasses are compared below in Table 1. toxicity table for H2S and physical effects are shown in Table II.

**Table 1**  
Permissible Exposure Limits of Various Gasses

Common Name	Symbol	Sp. Gravity	TLV	STEL	IDLH
Hydrogen Cyanide	HCN	.94	4.7 ppm	C	
Hydrogen Sulfide	H2S	1.192	10 ppm	15 ppm	100 ppm
Sulfide Dioxide	SO2	2.21	2 ppm	5 ppm	
Chlorine	CL	2.45	.5 ppm	1 ppm	
Carbon Monoxide	CO	.97	25 ppm	200 ppm	
Carbon Dioxide	CO2	1.52	5000 ppm	30,000 ppm	
Methane	CH4	.55	4.7% LEL	14% UEL	

### Definitions

- A. TLV – Threshold Limit Value is the concentration employees may be exposed to based on a TWA (time weighted average) for eight (8) hours in one day for 40 hours in one (1) week. This is set by ACGIH (American Conference of Governmental Hygienists and regulated by OSHA.
- B. STEL – Short Term Exposure Limit is the 15 minute average concentration an employee may be exposed to providing that the highest exposure never exceeds the OEL (Occupational Exposure Limit). The OEL for H2S is 19 PPM.
- C. IDLH – Immediately Dangerous to Life and Health is the concentration that has been determined by the ACGIH to cause serious health problems or death if exposed to this level. The IDLH for H2S is 100 PPM.
- D. TWA – Time Weighted Average is the average concentration of any chemical or gas for an eight (8) hour period. This is the concentration that any employee may be exposed to based on an TWA.

**TABLE II**  
Toxicity Table of H<sub>2</sub>S

Percent %	PPM	Physical Effects
.0001	1	Can smell less than 1 ppm.
.001	10	TLV for 8 hours of exposure
.0015	15	STEL for 15 minutes of exposure
.01	100	Immediately Dangerous to Life & Health. Kills sense of smell in 3 to 5 minutes.
.02	200	Kills sense of smell quickly, may burn eyes and throat.
.05	500	Dizziness, cessation of breathing begins in a few minutes.
.07	700	Unconscious quickly, death will result if not rescued promptly.
.10	1000	Death will result unless rescued promptly. Artificial resuscitation may be necessary.

## **PHYSICAL PROPERTIES OF H<sub>2</sub>S**

The properties of all gasses are usually described in the context of seven major categories:

COLOR  
ODOR  
VAPOR DENSITY  
EXPLOSIVE LIMITS  
FLAMMABILITY  
SOLUBILITY (IN WATER)  
BOILING POINT

Hydrogen Sulfide is no exception. Information from these categories should be considered in order to provide a fairly complete picture of the properties of the gas.

### **COLOR – TRANSPARENT**

Hydrogen Sulfide is colorless so it is invisible. This fact simply means that you can't rely on your eyes to detect its presence, a fact that makes the gas extremely dangerous to be around.

### **ODOR – ROTTEN EGGS**

Hydrogen Sulfide has a distinctive offensive smell, similar to "rotten eggs". For this reason it earned its common name "sour gas". However, H<sub>2</sub>S, even in low concentrations, is so toxic that it attacks and quickly impairs a victim's sense of smell, so it could be fatal to rely on your nose as a detection device.

### **VAPOR DENSITY – SPECIFIC GRAVITY OF 1.192**

Hydrogen Sulfide is heavier than air so it tends to settle in low-lying areas like pits, cellars or tanks. If you find yourself in a location where H<sub>2</sub>S is known to exist, protect yourself. Whenever possible, work in an area upwind and keep to higher ground.

### **EXPLOSIVE LIMITS – 4.3% TO 46%**

Mixed with the right proportion of air or oxygen, H<sub>2</sub>S will ignite and burn or explode, producing another alarming element of danger besides poisoning.

### **FLAMMABILITY**

Hydrogen Sulfide will burn readily with a distinctive clear blue flame, producing Sulfur Dioxide (SO<sub>2</sub>), another hazardous gas that irritates the eyes and lungs.

### **SOLUBILITY – 4 TO 1 RATIO WITH WATER**

Hydrogen Sulfide can be dissolved in liquids, which means that it can be present in any container or vessel used to carry or hold well fluids including oil, water, emulsion and sludge. The solubility of H<sub>2</sub>S is dependent on temperature and pressure, but if conditions are right, simply agitating a fluid containing H<sub>2</sub>S may release the gas into the air.

### **BOILING POINT – (-76 degrees Fahrenheit)**

Liquefied Hydrogen Sulfide boils at a very low temperature, so it is usually found as a gas.

**SURFACE USE AND OPERATIONS PLAN**  
**FOR DRILLING, COMPLETION, AND PRODUCING**

C.O.G. Operating, LLC  
Reindeer "21" Federal #3  
SL: 1980' FNL & 430' FWL     Unit E  
BHL: 1980' FNL & 330' FEL     Unit H  
Sec 21, T16S, R28E  
Eddy County, New Mexico

**LOCATED:**

Approximately 10 miles Northwest of Loco Hills

**OIL & GAS LEASE**

SL: NMNM #100844  
BHL: NMNM #100844

**RECORD TITLE LESSEE**

SL: COG Oil & Gas, LP – 550 West Texas Ave., Suite 1300, Midland, TX 79701  
BHL: COG Oil & Gas, LP – 550 West Texas Ave., Suite 1300, Midland, TX 79701

**BOND COVERAGE**

\$25,000 statewide bond of C.O.G. Operating, L.L.C.     NMB 000215

**SURFACE OWNER**

Bureau of Land Management

**MINERAL OWNER**

Bureau of Land Management

**GRAZING TENANT**

Bogle LTD Co., LLC, P.O. Box 460, Dexter, NM 88230  
(505) 734-5442

**POOL**

Wolfcamp

**PROPOSED TOTAL DEPTH**

This well will be drilled to a Horizontal Total Vertical Depth of approximately 6,520' and a Horizontal Total Measured Depth of approximately 11,070'.

**EXHIBITS**

- A. Well Location & Acreage Dedication Map
- B. Area Road Map
- C. Vicinity Oil & Gas Map
- D-1 & D-2. Topographic & Location Verification Map
- E1 & E-2. Proposed Lease Road and Pad Layout Map
- F. Drilling Rig Layout
- G. BOPE Schematic
- H. Choke Manifold Schematic

**EXISTING ROADS**

- A. Exhibit A is a portion of a section map showing the location of the proposed well as staked.
- B. Exhibit B is a map showing existing roads in the vicinity of the proposed well site.
- C. Directions to well location:  
From the junction of US Hwy 82 and County Road Southern Union, Go North on Southern Union for 2.5 miles winding northeast for 1.2 miles to lease road, on lease road go north 1.5 miles to lease road, on lease road go east 1.5 miles to lease road, on lease road go north 1.7 miles to proposed lease road.

**ACCESS ROADS**

- A. Length and Width: 251.2' long and 30' wide. The access road is on lease and road right-of-way is requested under APD. Please note Exhibits E-1 & E-2.
- B. Surface Material: Existing
- C. Maximum Grad: Less than five percent
- D. Turnouts: None necessary
- E. Drainage Design: Existing
- F. Culverts: None necessary
- G. Gates and Cattle Guards: None needed



### **LOCATION OF EXISTING WELLS**

Existing wells in the immediate area are shown in Exhibit C.

### **LOCATION OF EXISTING AND/OR PROPOSED FACILITIES**

Necessary production facilities for this well will be located on the well pad.

### **LOCATION AND TYPE OF WATER SUPPLY**

It is not contemplated that a water well will be drilled. Water necessary for drilling will be purchased and hauled to the site over existing roads shown on Exhibits E-1 and E-2.

### **METHODS OF HANDLING WASTE DISPOSAL**

- A. Drilling fluids will be allowed to evaporate in the drilling pits until the pits are dry.
- B. Water produced during tests will be disposed of in the drilling pits.
- C. Oil produced during tests will be stored in test tanks.
- D. Trash will be contained in a trash trailer and removed from well site.
- E. All trash and debris will be removed from the well site within 30 days after finishing drilling and/or completion operations.

### **ANCILLARY FACILITIES**

None required.

### **WELL SITE LAYOUT**

Exhibits G and H show the relative location and dimensions of the well pad, mud pits, reserve pit, and trash pit, and the location of major rig components.

**PLANS FOR RESTORATION OF THE SURFACE**

- A. After completion of drilling and/or completion operations, all equipment and other material not needed for operations will be removed. The well site will be cleaned of all trash and junk to leave the site in an as aesthetically pleasing condition as possible.
- B. After abandonment, all equipment, trash, and junk will be removed and the site will be clean.

**OTHER INFORMATION**

- A. **Topography:** The topography consists of sandy soil with native grasses. No wildlife was observed, but the usual inhabitants of this region are Jackrabbits, Reptiles, Coyotes, etc.
- B. **Soil:** Topsoil at the well site is sandy soil.
- C. **Flora and Fauna:** The location is in an area sparsely covered with mesquite and range grasses.
- D. **Ponds and Streams:** There are no rivers, lakes, ponds, or streams in the area.
- E. **Residences and Other Structures:** There are no residences within a mile of the proposed well site.
- F. **Archaeological, Historical, and Cultural sites:** An Archaeological Survey has been ordered and a copy to be sent to the BLM Office.
- G. **Land Use:** Grazing

**OPERATOR'S REPRESENTATIVE**

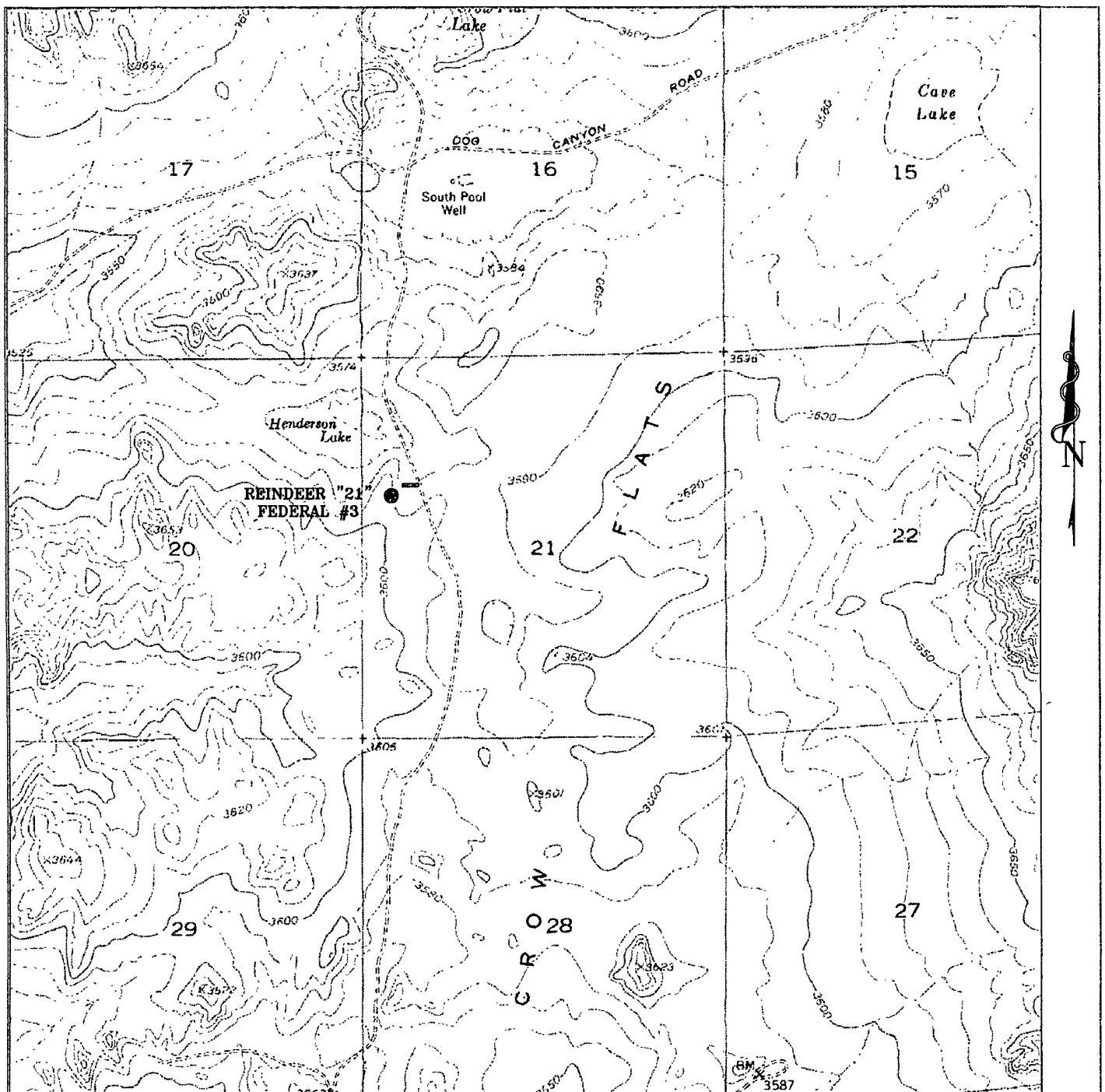
John Coffman  
C.O.G. Operating, LLC  
550 W. Texas Ave, Suite 1300  
Midland, TX 79701  
(432) 683-7443

### CERTIFICATION

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access route; that I am familiar with the conditions which presently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and, that the work associated with the operations proposed herein will be performed by the C.O.G. Operating, LLC Company and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved.

5-2-08  
Date

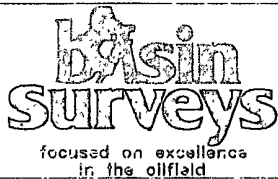
John Coffman  
John Coffman



### REINDEER "21" FEDERAL #3

Located at 1980' FNL and 430 FWL

Section 21, Township 16 South, Range 28 East,  
N.M.P.M., Eddy County, New Mexico.



P.O. Box 1786  
1120 N. West County Rd.  
Hobbs, New Mexico 88241  
(505) 393-7316 - Office  
(505) 392-3074 - Fax  
basinsurveys.com

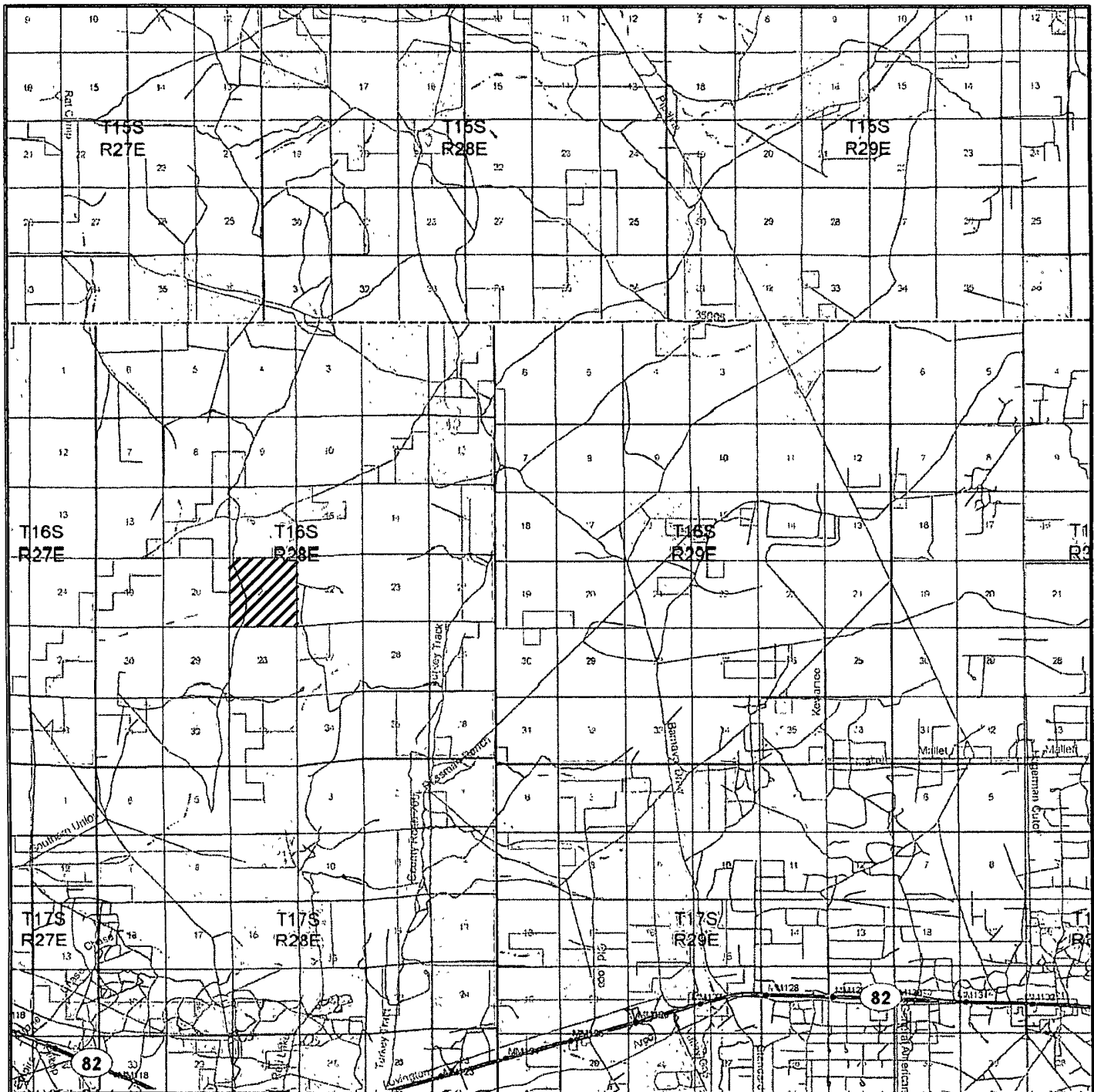
W.O. Number: JMS 18744T

Survey Date: 11-25-2007

Scale: 1" = 2000'

Date: 11-27-2007

**C.O.G.  
OPERATING  
L.L.C.**



### REINDEER "21" FEDERAL #3

Located at 1980' FNL and 430' FWL

Section 21, Township 16 South, Range 28 East,  
N.M.P.M., Eddy County, New Mexico.

**basin**  
**surveys**

focused on excellence  
in the oilfield

P.O. Box 1786  
1120 N. West County Rd.  
Hobbs, New Mexico 88241  
(505) 393-7316 - Office  
(505) 392-3074 - Fax  
basinsurveys.com

W.O. Number: JMS 18744TR

Survey Date: 11-25-2007

Scale: 1" = 2 MILES

Date: 11-27-2007

C.O.G.  
OPERATING  
L.L.C.

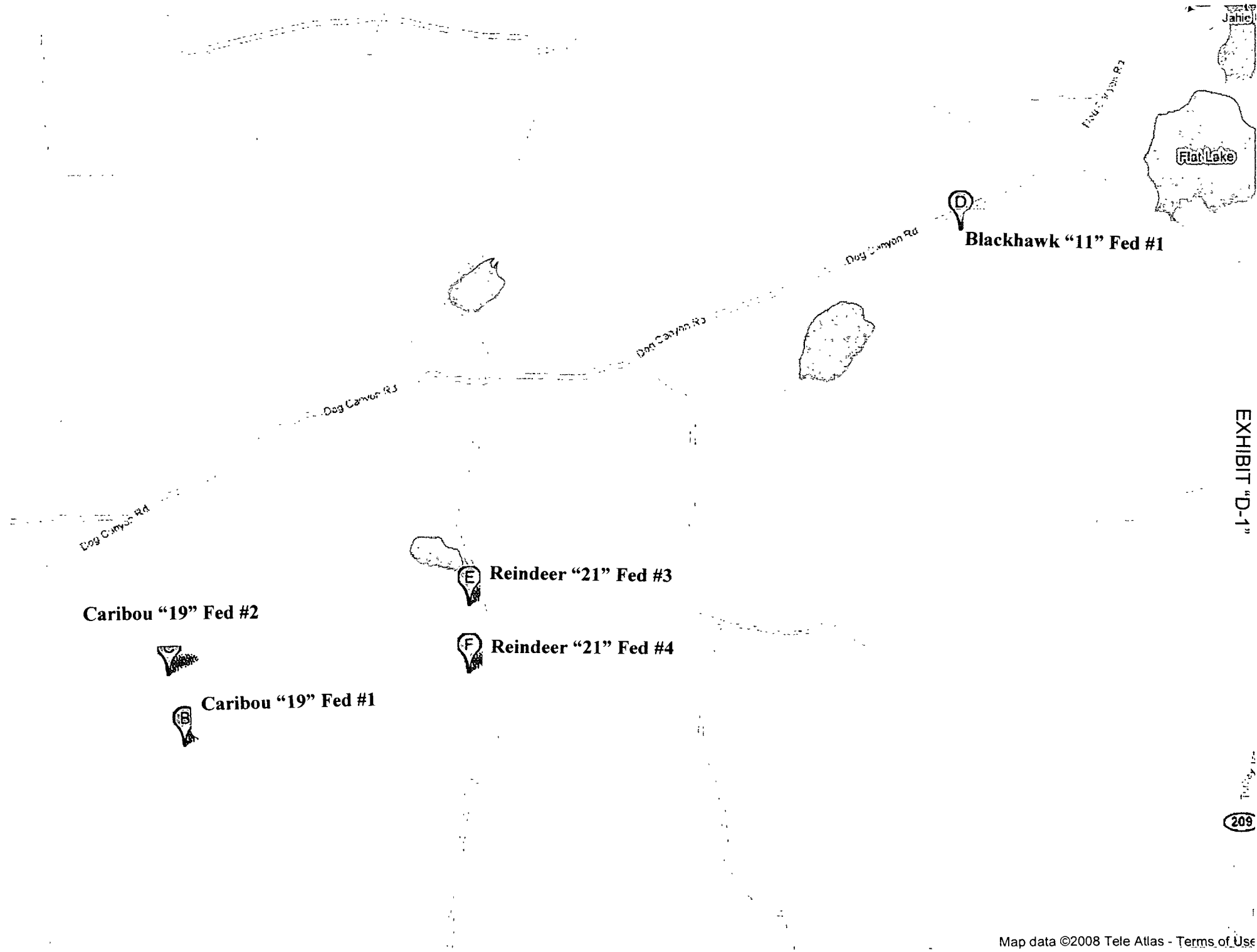


EXHIBIT "D-1"

EXHIBIT "D-2"

Blackhawk "11" Fed #1

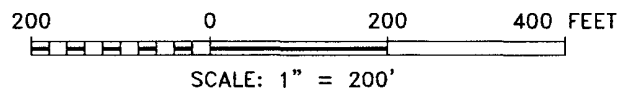
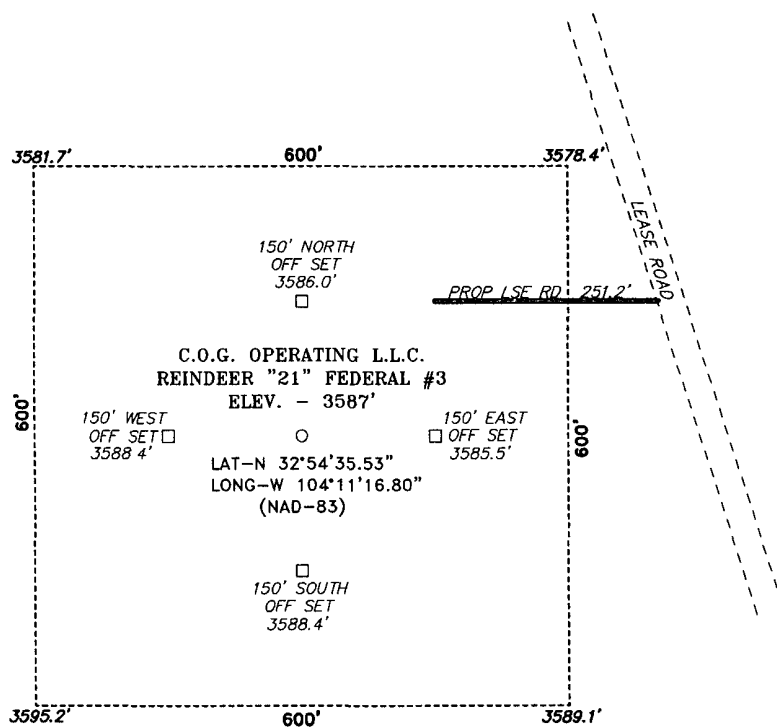
Reindeer "21" Fed #3

Reindeer "21" Fed #4

Caribou "19" Fed #2

Caribou "19" Fed #1

SECTION 21, TOWNSHIP 16 SOUTH, RANGE 28 EAST, N.M.P.M.,  
EDDY COUNTY, NEW MEXICO.



## DIRECTIONS TO LOCATION:

FROM THE JUNCTION OF US HWY 82 AND CO. RD.  
SOUTHERN UNION, GO NORTH ON SOUTHERN UNION  
FOR 2.5 MILES WINDING NORTHEAST FOR 1.2 MILES TO  
LEASE ROAD, ON LEASE ROAD GO NORTH 1.5 MILES  
TO LEASE ROAD, ON LEASE ROAD GO EAST 1.5 MILES  
TO LEASE ROAD, ON LEASE ROAD GO NORTH 1.7  
MILES TO PROPOSED LEASE ROAD.

**BASIN SURVEYS** P.O. BOX 1786-HOBBS, NEW MEXICO

W.O. Number: 18744

Drawn By: J. M. SMALL

Date: 11-27-2007

Disk: JMS 18744W

## C.O.G. OPERATING L.L.C.

REF: REINDEER "21" FEDERAL #3 / Well Pad Topo

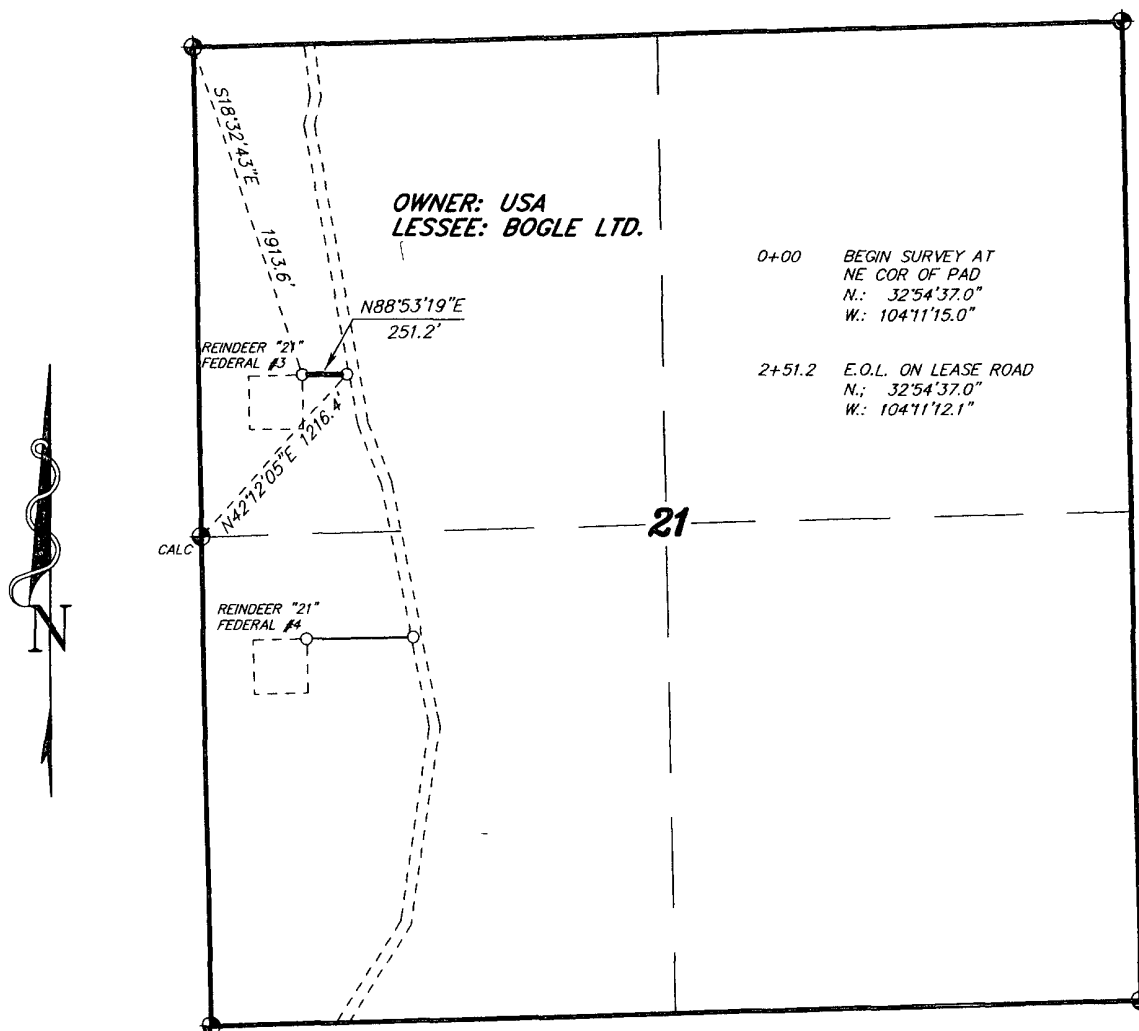
THE REINDEER "21" FEDERAL #3 LOCATED 1980' FROM  
THE NORTH LINE AND 430' FROM THE WEST LINE OF  
SECTION 21, TOWNSHIP 16 SOUTH, RANGE 28 EAST,  
N.M.P.M., EDDY COUNTY, NEW MEXICO.

Survey Date: 11-25-2007

Sheet 1 of 1 Sheets



SECTION 21, TOWNSHIP 16 SOUTH, RANGE 28 EAST, N.M.P.M.,  
EDDY COUNTY, NEW MEXICO.



LEGAL DESCRIPTION

A STRIP OF LAND 20.0 FEET WIDE, LOCATED IN SECTION 21, TOWNSHIP 16 SOUTH, RANGE 28 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO AND BEING 10.0 FEET LEFT AND RIGHT OF THE FOLLOWING DESCRIBED CENTERLINE SURVEY.

SECTION 21 = 251.2 FEET = 0.05 MILES = 15.22 RODS = 0.12 ACRES

I HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM FIELD NOTES OF AN ORIGINAL SURVEY AND MEETS OR EXCEEDS ALL REQUIREMENTS FOR LAND SURVEYS AS SPECIFIED BY THIS STATE.

GARY L. JONES

TEXAS P.L.S.

No. 7977

No. 5074

**BASIN SURVEYS** P.O. BOX 1786—HOBBS, NEW MEXICO

W.O. Number: 18744

Drawn By: J. M. SMALL

Date: 11-27-2007

Disk: JMS 18744R

1000 0 1000 2000 FEET

**C.O.G. OPERATING L.L.C.**

REF: PROP. LEASE ROAD TO THE REINDEER "21" FEDERAL #3

A LEASE ROAD CROSSING USA LAND IN  
SECTION 21, TOWNSHIP 16 SOUTH, RANGE 28 EAST,  
N.M.P.M., EDDY COUNTY, NEW MEXICO.

Survey Date: 11-25-2007

Sheet 1 of 1 Sheets

## PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	LC-100844
WELL NAME & NO.:	3-Reindeer 21 Federal
SURFACE HOLE FOOTAGE:	1980' FNL & 430' FWL
BOTTOM HOLE FOOTAGE:	1980' FNL & 330' FEL
LOCATION:	Section 21, T. 16 S., R 28 E., NMPM
COUNTY:	Eddy County, New Mexico

### TABLE OF CONTENTS

Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
  - Cave/Karst
- ☒ **Construction**
  - Notification
  - Topsoil
  - Reserve Pit
  - Federal Mineral Material Pits
  - Well Pads
  - Roads
- ☒ **Road Section Diagram**
- ☒ **Drilling**
- ☐ **Production (Post Drilling)**
  - Well Structures & Facilities
  - Pipelines
  - Electric Lines
- ☐ **Reserve Pit Closure/Interim Reclamation**
- ☐ **Final Abandonment/Reclamation**

## **I. GENERAL PROVISIONS**

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

## **II. PERMIT EXPIRATION**

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

## **III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES**

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

## **IV. NOXIOUS WEEDS**

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

## **V. SPECIAL REQUIREMENT(S)**

**Mitigation Measures:** The mitigation measures include the Pecos District Conditions of Approval, the standard stipulation for High cave/karst occurrence, and the standard stipulations for permanent resource roads.

**Reindeer 21 Federal # 3:** Pit South V-Door West

### **Conditions of Approval**

#### **Cave and Karst**

EA#: NM-520-08-1146

Lease #: NM-95630, NM-103873, NMLC-100844

**COG Operating LLC.**

**Black Hawk 11 Fed. Com. # 1, Caribou 19 Fed. # 1, Caribou 19 Fed. Com. # 2,**

**Reindeer 21 Fed. # 3, Reindeer 21 Fed. # 4**

**\*\* Depending on location, additional Drilling, Casing, and Cementing procedures may be required by engineering to protect critical karst groundwater recharge areas.**

#### **Cave/Karst Surface Mitigation**

The following stipulations will be applied to minimize impacts during construction, drilling and production.

#### **Berming:**

Tank batteries will be bermed to contain 1 ½ times the content of the largest tank.

Bermed areas will be lined with a 4 oz. felt liner to prevent tears or punctures and a permanent 20 mil plastic liner.

#### **Leak Detection System:**

A method of detecting leaks is required. The method could incorporate gauges to measure loss, siting valves and lines so they can be visually inspected, or installing electronic sensors to alarm when a leak is present. Leak detection plan will be submitted to BLM for approval.

#### **Closed Mud System with Buried Cuttings Pit/Drying Area:**

All fluids will be held in steel tanks and hauled off. A 70X100 foot cutting's pit may be utilized for this location. The cutting's pit will be lined with 4 oz. felt and a layer of 20 mil. plastic. Upon completion of the well all excess fluids will be vacuumed off the cuttings pit and allowed to dry. The pit liner will then be folded over the washed cuttings, covered with a 20 mil plastic cover and then covered with at least three feet of top soil. In order to help minimize the total surface disturbance an equipment storage area and parking off-site of caliche or mineral material areas will be allowed.

### **Cave/Karst Subsurface Mitigation**

The following stipulations will be applied to protect cave/karst and ground water concerns:

#### **Fresh Water Drilling:**

The surface interval down to the bottom of the karst zone will be drilled with fresh water.

#### **Lost Circulation:**

ALL lost circulation zones from the surface to the base of the cave occurrence zone will be logged and reported in the drilling report.

Regardless of the type of drilling machinery used, if a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

#### **Delayed Blasting:**

Any blasting will be phased and time delayed.

#### **Abandonment Cementing:**

Upon well abandonment the well bore will be cemented completely from 100 feet below the bottom of the cave bearing zone to the surface.

## **VI. CONSTRUCTION**

### **A. NOTIFICATION**

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (505) 234-5972 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

### **B. TOPSOIL**

The operator shall stockpile the topsoil of the well pad. The topsoil to be stripped is approximately 4 inches in depth. The topsoil shall not be used to backfill the reserve pit and will be used for interim and final reclamation.

### **C. RESERVE PITS**

The reserve pit shall be constructed and closed in accordance with the NMOCD rules.

**The reserve pit shall be constructed 160' X 160' on the South side of the well pad V-Door West.**

The reserve pit shall be constructed, so that upon completion of drilling operations, the dried pit contents shall be buried a minimum depth of three feet below ground level. Should the pit content level not meet the three foot minimum depth requirement, the excess contents shall be removed until the required minimum depth of three feet below ground level has been met. The operator shall properly dispose of the excess contents at an authorized disposal site.

The reserve pit shall be constructed and maintained so that runoff water from outside the location is not allowed to enter the pit. The berms surrounding the entire perimeter of the pit shall extend a minimum of two (2) feet above ground level. At no time will standing fluids in the pit be allowed to rise above ground level.

The reserve pit shall be fenced on three (3) sides during drilling operations. The fourth side shall be fenced immediately upon rig release.

#### **D. FEDERAL MINERAL MATERIALS PIT**

If the operator elects to surface the access road and/or well pad, mineral materials extracted during construction of the reserve pit may be used for surfacing the well pad and access road and other facilities on the lease.

Payment shall be made to the BLM prior to removal of any additional federal mineral materials from any site other than the reserve pit. Call the Carlsbad Field Office at (505) 234-5972.

#### **E. WELL PAD SURFACING**

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation.

The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

#### **F. ON LEASE ACCESS ROADS**

##### **Road Width**

The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed thirty (30) feet.

### **Surfacing**

Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

### **Crowning**

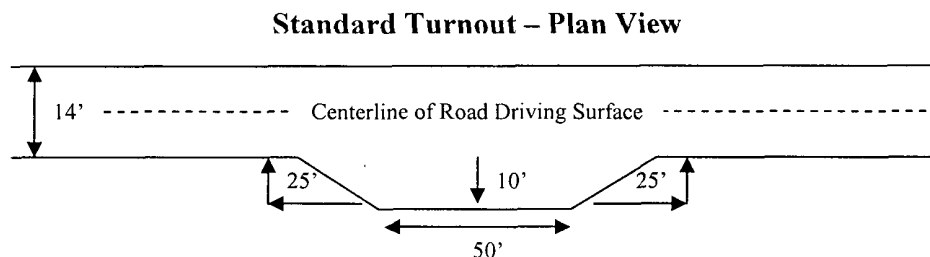
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

### **Ditching**

Ditching shall be required on both sides of the road.

### **Turnouts**

Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall be constructed on all blind curves. Turnouts shall conform to the following diagram:

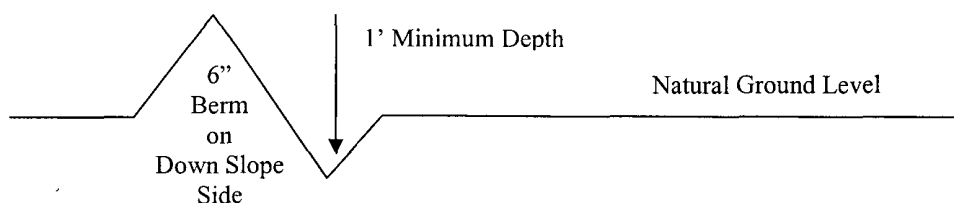


### **Drainage**

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

### Cross Section of a Typical Lead-off Ditch



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

### Formula for Spacing Interval of Lead-off Ditches

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

$$400 \text{ foot road with } 4\% \text{ road slope: } \frac{400'}{4\%} + 100' = 200' \text{ lead-off ditch interval}$$

### Culvert Installations

Appropriately sized culvert(s) shall be installed at the deep waterway channel flow crossing.

### Cattleguards

An appropriately sized cattleguard(s) sufficient to carry out the project shall be installed and maintained at fence crossing(s).

Any existing cattleguard(s) on the access road shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattleguard(s) that are in place and are utilized during lease operations.

A gate shall be constructed and fastened securely to H-braces.

### Fence Requirement

Where entry is required across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting.

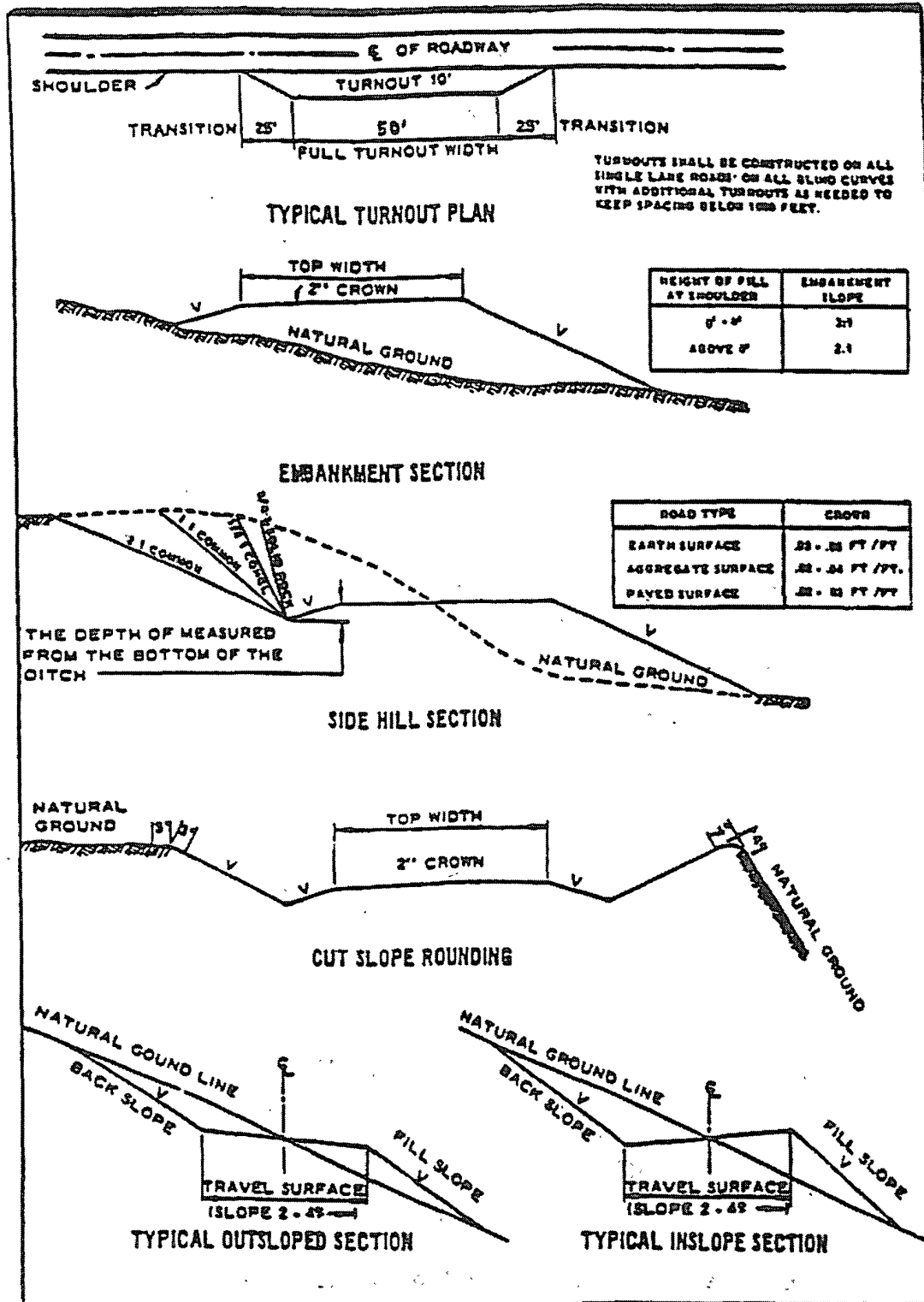


The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fence(s).

**Public Access**

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

Figure 1 – Cross Sections and Plans For Typical Road Sections



## **VII. DRILLING**

### **A. DRILLING OPERATIONS REQUIREMENTS**

The BLM is to be notified a minimum of 4 hours in advance for a representative to witness:

- a. Spudding well
- b. Setting and/or Cementing of all casing strings
- c. BOPE tests

☒ **Eddy County**

**Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,  
(575) 361-2822**

1. **Although Hydrogen Sulfide has not been reported in this section, it is always a potential hazard. If Hydrogen Sulfide is encountered, please report measured amounts and formations to the BLM.**
2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

### **B. CASING**

**Changes to the approved APD casing and cement program require submitting a sundry and receiving approval prior to work. Failure to obtain approval prior to work will result in an Incident of Non-Compliance being issued.**

**Centralizers required on surface casing per Onshore Order 2.III.B.1.f.**

**Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string.**

**No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.**

**High cave/karst.**

**Possible lost circulation in the Grayburg and San Andres formations.**

**Possible high pressure gas bursts in the Wolfcamp.**

1. The 13-3/8 inch surface casing shall be set at **approximately 500 feet** and cemented to the surface.
  - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with a surface log readout will be used or a cement bond log shall be run to verify the top of the cement.
  - b. Wait on cement (WOC) time for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement).
  - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
  - d. If cement falls back, remedial cementing will be done prior to drilling out that string.

**Drill intermediate casing hole with fresh water mud.**

2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:

☒ Cement to surface. If cement does not circulate see B.1.a-d above.

**If 75% or greater lost circulation occurs while drilling the intermediate casing hole, the cement on the production casing must come to surface.**

**Centralizers required on horizontal leg, must be type for horizontal service and minimum of one every other joint.**

3. The minimum required fill of cement behind the 5-1/2 inch production casing is:

☒ Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification. **Additional cement will be required to achieve this height of cement.**

4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

#### **C. PRESSURE CONTROL**

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
  - a. The tests shall be done by an independent service company.
  - b. The results of the test shall be reported to the appropriate BLM office.
  - c. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
  - d. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug.
  - e. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the **Wolfcamp** formation **if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days**. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.
  - f. A variance to test the surface casing and BOP/BOPE (**entire system**) to the reduced pressure of **1000** psi with the rig pumps is approved.

#### **D. DRILLING MUD**

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the **Wolfcamp** formation, and shall be used until production casing is run and cemented.

**E. DRILL STEM TEST**

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

**WWI 060708**

## **VIII. PRODUCTION (POST DRILLING)**

### **A. WELL STRUCTURES & FACILITIES**

#### **Placement of Production Facilities**

Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

#### **Containment Structures**

The containment structure shall be constructed to hold the capacity of the entire contents of the largest tank, plus 24 hour production, unless more stringent protective requirements are deemed necessary by the Authorized Officer.

#### **Painting Requirement**

All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color Shale Green, Munsell Soil Color Chart # 5Y 4/2

### **B. PIPELINES**

### **C. ELECTRIC LINES**

## **IX. INTERIM RECLAMATION & RESERVE PIT CLOSURE**

### **A. INTERIM RECLAMATION**

If the well is a producer, interim reclamation shall be conducted on the well site in accordance with the orders of the Authorized Officer. The operator shall submit a Sundry Notices and Reports on Wells (Notice of Intent), Form 3160-5, prior to conducting interim reclamation.

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

At the time reserve pits are to be reclaimed, operators should work with BLM surface management specialists to devise the best strategies to reduce the size of the location. Any reductions should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche may be used for road repairs; fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed.

If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

## **B. RESERVE PIT CLOSURE**

The reserve pit, when dried and closed, shall be recontoured, all trash removed, and reseeded as follows:

### **Seed Mixture 4, for Gypsum Sites**

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)\* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed\* per acre:

<u>Species</u>	<u>lb/acre</u>
Alkali Sacaton ( <i>Sporobolus airoides</i> )	1.0
DWS <u>Four-wing saltbush</u> ( <i>Atriplex canescens</i> )	5.0

DWS: DeWinged Seed

\*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed  
(Insert Seed Mixture Here)



## **X. FINAL ABANDONMENT & REHABILITATION REQUIREMENTS**

Upon abandonment of the well and/or when the access road is no longer in service the Authorized Officer shall issue instructions and/or orders for surface reclamation and restoration of all disturbed areas.

On private surface/federal mineral estate land the reclamation procedures on the road and well pad shall be accomplished in accordance with the private surface land owner agreement.